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## ABSTRACT

Oklahoma is one of three states to offer a free prekindergarten (pre-K) program to all students in participating school districts on a voluntary basis. Fortuitous circumstances in Tulsa, Oklahoma, the state's largest school district, permitted an unusually rigorous evaluation of the pre-K program in Tulsa. Because 4-year-olds beginning pre-K and 5-year-olds beginning kindergarten were administered the same test in September 2001 and because strict eligibility cutoffs were applied (based on date of birth), it was possible to control for selection effects, in addition to gender, race/ethnicity, school lunch eligibility, and precise date of birth. The evaluation showed strong positive effects of the pre-K program on children's language and cognitive test scores, but not on scores for social-emotional or motor skills. Hispanic children benefited most from the program, and Black children also showed sharp gains, especially when they attended full-day programs. In contrast, only those white children enrolled in a half-day pre-K program showed significant gains and only in language skills. A similar pattern of results characterized children who qualified for free lunch, for whom significant benefits derived from full- and part-day programs; children who qualified for a reduced price lunch, for whom only full-day programs produced gains; and children who did not qualify for lunch benefits, where no net gain was apparent. The findings were examined in light of contemporary controversies regarding targeted or universal pre-K programs; full- or part-day programming; public school or multiple delivery sites; strategies for ensuring high quality, effective programs; and the need for rigorous program evaluations. (Contains 32 footnotes). (Author/KB)

CROCUS WORKING PAPER #2

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THE EFFECTS OF UNIVERSAL PRE-K IN OKLAHOMA:

RESEARCH HIGHLIGHTS AND POLICY IMPLICATIONS

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Abstract

Oklahoma is one of only three states in the nation to offer a free pre-kindergarten (pre-K) program to all students in participating school districts on a voluntary basis. Fortuitous circumstances in Tulsa, Oklahoma, the state's largest school district, permitted an unusually rigorous evaluation of the pre-K program in Tulsa. Because four-year olds beginning pre-K and five-year olds beginning kindergarten were administered the same test in September 2001 and because strict eligibility cut-offs were applied, based on date of birth, it was possible to control for selection effects, in addition to gender, race/ethnicity, school lunch eligibility, and precise date of birth. The evaluation showed strong positive effects of the pre-K program on children's language and cognitive test scores, but not on scores for social-emotional or motor skills. Hispanic children benefited most from the program and black children also showed sharp gains, especially when they attended full-day programs. In contrast, only those white children enrolled in a half-day pre-K program showed significant gains and only in language skills. A similar pattern of results characterized children who qualified for a free lunch, for whom significant benefits derived from full-and part-day programs; children who qualified for a reduced price lunch, for whom only full-day programs produced gains; and children who did not qualify for lunch benefits, where no net gain was apparent. The results are discussed in light of contemporary controversies regarding targeted or universal pre-K programs; full- or part-day programming; public school or multiple delivery sites; strategies for ensuring high quality, effective programs; and the need for rigorous program evaluations.

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THE EFFECTS OF UNIVERSAL PRE-K IN OKLAHOMA:  
RESEARCH HIGHLIGHTS AND POLICY IMPLICATIONS

Throughout the U.S. there is growing interest in pre-K programs that might enhance the school readiness of young children. As of 2002, 46 states had publicly-funded pre-K programs for four-year-olds.<sup>1</sup> The typical pattern is to make these programs available to disadvantaged children. Only three states B Georgia, Oklahoma, and New York B have a program that is available to all four-year-olds in participating school districts, irrespective of income. The District of Columbia also has a program that in principle is available to all children. In Georgia and Oklahoma, the overwhelming majority of school districts have chosen to participate; and a majority of parents of four-year-olds have chosen to enroll their children. In New York, budget difficulties have limited participation so that universality has not been realized.

In this paper, we assess Oklahoma's pre-K program by focusing on Tulsa, the largest school district in the state. First, we review the history of Oklahoma's program. Second, we identify some of the distinctive features of Oklahoma's program. Third, we provide a brief introduction to the Tulsa Public Schools and explain why it was feasible to conduct an unusually rigorous evaluation there. Fourth, we summarize evidence from the Tulsa pre-K program evaluation. Fifth, we consider the public policy implications of these findings, for Oklahoma,

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<sup>1</sup> Danielle Ewen and Katherine Hart, *State Developments in Child Care, Early Education, and School-Age Care 2002* (Washington, D.C.: Children's Defense Fund), p. 108.

for other states, and for the nation.

#### A Brief History of Pre-K in Oklahoma

In 1990 the Oklahoma Legislature passed a major education reform bill, which raised teacher salaries, reduced class sizes, and made pre-K available to four-year-old children who were poor enough to qualify for a free or reduced-price lunch. Public school districts were free to participate or not, as they wished. If they participated, they received additional funds for each child enrolled in a pre-K program B roughly, \$1,000 to \$1,200 per child.

The pre-K program quickly won supporters, including especially the parents of enrolled children. By the 1992-93 school year, approximately 10 percent of all four-year olds in Oklahoma were enrolled in a publicly-funded pre-K program. An even higher percentage of poor four-year-olds were enrolled. But the program also attracted criticism, partly because of a loophole that permitted school districts to receive financial benefits from the state by enrolling four-year-olds in a kindergarten program. If they enrolled a child in a full-day kindergarten program, they could receive as much as \$3,500 per child per year. As word of this loophole spread, many school districts took advantage of it, which distressed lawmakers for various reasons. Some worried about the high cost per child; others wondered whether four-year-old children would receive developmentally appropriate care in a kindergarten program. In addition, some community leaders and lawmakers asked: if a preschool education promotes school readiness, as many experts argue, shouldn't all Oklahoma four-year-olds have access to such a program?

With these concerns in mind, Rep. Joe Eddins (D.-Vineta) and Sen. Penny Williams (D.-

Tulsa) sponsored legislation that would allow school districts to receive state funding for all four-year-old children enrolled in a pre-K program, regardless of income. Eventually, Eddins and Williams produced a bill that won bipartisan legislative support and that was signed into law by Gov. Frank Keating (R.-Okla.) in May 1998. This bill authorized public school districts to provide pre-K programs to four-year-olds and to receive state funding according to a complex weighting scheme, with more funding per child for disabled, bilingual, and poor children. There was no separate line-item for the program in the state budget, nor was there an explicit increase in state appropriations for education. Rather, in the words of Rep. Eddins, the program was "funded through dilution," with other education programs effectively receiving less funding in order to make this program possible. However, at the time the bill was passed, education appropriations increased by 6.5 percent. Also, Oklahoma's K-12 enrollments declined throughout most of the 1990s. As a result, most school districts were able to expand their pre-K program considerably without adversely affecting other education programs.

Like its predecessor program, the expanded Oklahoma pre-K program utilizes public school districts to deliver services directly to students. In this respect, Oklahoma's program differs significantly from both the Georgia and New York programs, which rely on a mix of service delivery mechanisms. In Georgia, for example, 57 percent of the publicly-funded pre-K programs are run by private operators, such as for-profit or nonprofit day care centers. In contrast, all of Oklahoma's pre-K programs are run by the public schools, though collaborations with Head Start programs and day care centers are not uncommon.

The program proved phenomenally popular, especially in large metropolitan areas like Tulsa and Oklahoma City, with relatively large populations of disadvantaged children. By 2001-

02, 494 of the 543 school districts in Oklahoma were participating, with a penetration rate of 65 percent.<sup>2</sup>

#### Oklahoma's Blueprint for Program Quality

Oklahoma made a commitment to program quality from the inception of pre-K and has sustained this commitment through the transition to universality. According to the 1998 law, all pre-K teachers must have a college degree and a certificate in early childhood education. Pre-K teachers also receive the same compensation and benefits as teachers in public elementary schools. These two requirements distinguish Oklahoma's pre-K program from child care centers in Oklahoma and elsewhere. Whereas 100 percent of Oklahoma's pre-K teachers have a college degree, fewer than 20 percent of non-home-based day care providers nationwide have a college degree<sup>3</sup>. Whereas Oklahoma's pre-K teachers have a starting salary of at least \$27,060, the average starting salary for child care providers nationwide is \$16,980<sup>4</sup>. In Oklahoma,

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<sup>2</sup> This penetration rate includes Head Start programs with some sort of collaborative relationship with the public schools. In effect, it means that 65 percent of Oklahoma four-year-olds were participating in either the state-funded pre-K program or a Head Start collaborative program. Source: Melissa Basse, Oklahoma Department of Education, personal communication, August 13, 2003.

<sup>3</sup> Unpublished tables based on data regarding workers in the Child Day Care Services industry from the 2002 Current Population Survey, Keystone Research Center, *Tracking the Educational Qualifications of Early Care and Education Workers Using the Current Population Survey*, July 2003.

<sup>4</sup> U.S. Department of Labor. Bureau of Labor Statistics. (2001). 2001 National Occupational Employment and Wage Estimates (data for Child Care Workers). Washington, DC: U.S. DO ([www.bls.gov/oes/2001/oes399011.htm](http://www.bls.gov/oes/2001/oes399011.htm)).

specifically, center-based child care teachers earn, on average \$9.30/hour<sup>5</sup>. In contrast, wages for pre-K teachers at Oklahoma's public schools are much higher. In Tulsa, for example, the average wage for pre-K teachers was \$25.67/hour in 2002-03.<sup>6</sup>

Strong teacher qualifications distinguish Oklahoma's pre-K program from many other states' pre-K programs, from Head Start, and from Oklahoma's child care centers. Only 12 of the 33 states with state-funded pre-K programs recently surveyed by Gilliam and Ripple<sup>7</sup> require their pre-K teachers to possess both a BA, typically specific to the field of early childhood education, and a teaching certificate. Georgia, for example, allows its lead teachers to have a two-year Associate's degree in early childhood education in lieu of a four-year degree. It is not uncommon for states to accept teachers with only a Child Development Associate (CDA) Certificate<sup>8</sup>. Under 30 percent of Head Start teachers have a bachelor's degree or higher.<sup>9</sup>

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<sup>5</sup>Center for the Child Care Workforce (March 2002). *Current Data on Child Care Salaries and Benefits in the United States*. Washington, DC: CCW.

<sup>6</sup> Personal interview with Charles Stidham, Treasurer, Tulsa Public Schools, August 4, 2003. The average salary for all TPS teachers was \$33,500; by contract, TPS teachers work 7.25 hours per day, 180 days per year.

<sup>7</sup>Gilliam, W.S., & Ripple, C.H. (In press). What can be learned from state-funded prekindergarten initiatives? A data-based approach to the Head Start devolution debate. In E. Zigler & S.J. Styfco (Eds.), *The Head Start Debates (friendly and otherwise)*. New Haven, CT: Yale University Press.

<sup>8</sup>The CDA requires teachers to possess at least: (1) a high school diploma or equivalent, (2) 480 clock hours of appropriate preschool experience; (3) 120 clock hours of specific formal early-childhood education; (4) documented competency through formal observation of their teaching, and (5) passing scores on the CDA written and oral examinations (Council for Early Childhood Professional Recognition, 1996).

<sup>9</sup> U.S. Department of Health and Human Services, *FACES Findings: New Research on*

Within Oklahoma, licensing requirements for lead teachers in child care centers are much weaker than pre-K teacher requirements. Specifically, lead teachers in child care centers must be at least 19 years of age, have a high school diploma or GED, and at least 12 college credit hours of training in early education or a related field.

Oklahoma's pre-K program is also characterized by relatively strict ratio and group size requirements. By state law, group sizes for Oklahoma's pre-K program are set at 20 and child/staff ratios cannot exceed 10/1. These requirements correspond to the accreditation guidelines of the National Association for the Education of Young Children (NAEYC), as well as to program guidelines for Head Start. In practice, Head Start exceeds these guidelines with an average group size of 13.6 and child to teacher ratio of 6.2:1 for 3- and 4-year old classrooms combined (see FN #7). Most state pre-K programs require group sizes and ratios that correspond loosely to those of Oklahoma (see FN #5). However, only 6% of child care centers nationally are accredited by NAEYC and thus clearly in compliance with their guidelines.<sup>10</sup> Within Oklahoma itself, child care centers are allowed to have child/staff ratios of 15/1 and group sizes of 30 for four-year old children.<sup>11</sup>

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*Head Start Program Quality and Outcomes* (Washington, D.C.: DHHS, June 2002). As of FY2003, at least half of all Head Start teachers must hold a 2-year associates degree or higher in a field related to early childhood education.

<sup>10</sup> Personal communication from Mark Ginsberg, Executive Director, NAEYC, August 8, 2003.

<sup>11</sup> Source: <http://nrc.uchsc.edu/oklahoma/oklahoma.htm> (Licensing Requirements for Child Care Centers, 2/1/2002), accessed August 7, 2003. Centers that seek to be designated as Athree star@ centers must meet NAEYC requirements for ratios and group sizes, plus additional teacher qualification requirements. See Oklahoma Department of Human Services, AReaching for the Stars: For Child Care Centers,@ Oklahoma DHS Publication No. 99-39, rev. June 1, 2003.

All of these program requirements have important implications for program quality. Studies of child care centers, for example, show that children progress more rapidly at centers with low child-staff ratios, small group sizes, and teachers who are well-educated, well-trained, and well-paid<sup>12</sup>. The best early intervention programs have also shared many of these same characteristics<sup>13</sup>. In short, there are reasons to expect that Oklahoma's pre-K program should have a positive impact on young children. An alternative approach to program quality, which Oklahoma declined to pursue, is for the state to mandate use of specific curricula or compliance with explicit pedagogical guidelines. Unlike Georgia, which established a clear set of pedagogical principles to accompany its pre-K program,<sup>14</sup> Oklahoma leaves these matters in the

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<sup>12</sup>Love, J.M., Schochet, P.Z., & Meckstroth, A.L. (May 1996). Are they in any real danger? *What research does and doesn't tell us about child care quality and children's well-being*. Princeton, NJ: Mathematica Policy Research, Inc.; Phillips, D., Mekos, D., Scarr, S., McCartney, K., & Abbott-Shim, M. (2000). Within and beyond the classroom door: Assessing quality in child care centers. *Early Childhood Research Quarterly*, 15(4), 475-496.; Vandell, D.L. & Wolfe, B. (May 2000). *Child care quality: Does it matter and does it need to be improved?* Washington, DC: U.S. DHHS, Office of the Assistant Secretary for Planning and Evaluation.

<sup>13</sup>Barnett, W.S. (1998). Long-term effects on cognitive development and school success. In W.S. Barnett & S.S. Boocock (Eds.), *Early care and education for children in poverty* (pp. 11-44). Albany: State University New York Press.; Karoly L.A., Greenwood, P.W., Everingham, S.S., Hoube, J., Kilburn, M.R., Rydell, C.P., Sanders, M., & Chiesa, J. (1998). *Investing in our children: What we know and don't know about the costs and benefits of early childhood interventions*. Washington, DC: Rand Corporation.

<sup>14</sup> The Georgia Office of School Readiness, which runs the pre-K program, has prepared a 12-page, single-spaced list of curriculum goals. For example, language development features four goals: Children will develop and expand receptive language (listening) skills; Children will develop and expand expressive language (speaking) skills; Children will begin to develop age-appropriate writing skills; and Children will begin to develop age-appropriate strategies that will assist them in reading. Each goal includes lots of specific examples. See <http://www.osr.state.ga.us/Prekgoals.htm>.

hands of individual school districts is a practice that characterizes the vast majority of state pre-K programs. As a result, Oklahoma's pre-K teachers, in consultation with their principals and other school officials, have often created their own curriculum. In other instances, they have borrowed from such standardized curricula as Success for All, the Waterford Early Learning Program, Integrated Thematic Instruction, Creative Curriculum, Scholastic Inc's 4-year old curriculum, and Direct Instruction. One school offers full immersion French and Spanish programs. The only explicit policy that may have had some unifying effect on teaching practices is the mandated use of a state report card that establishes benchmarks for children's achievement in areas ranging from language arts, math, and science to behavior and social skills.<sup>15</sup>

#### Tulsa Public Schools as a Research Site

The Tulsa Public Schools (TPS) system is the largest in the state of Oklahoma (41,495 students), slightly bigger than the Oklahoma City school system (37,231 students). Its students include a good cross-section of racial and ethnic groups (see Table 1). As of October 2002, 77 percent of its students qualified for a free or reduced-price school lunch, as opposed to 52 percent of Oklahoma students.<sup>16</sup> Thus, Tulsa students are poorer than Oklahoma students as a whole, who in turn are somewhat poorer than students nationwide.<sup>17</sup> Aside from collaborative

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<sup>15</sup> Beginning in July 2003, pre-K curriculum guidelines developed by the state Department of Education became available to pre-K programs. As the term guideline implies, however, these are voluntary, not mandatory.

<sup>16</sup> Oklahoma State Department of Education, Low Income Report for 2002-2003. According to Joanie Hildenbrand, Oklahoma Department of Education, the figures are based on October 2002 data.

<sup>17</sup> Oklahoma has a higher child poverty rate (20%) than the U.S. average (17%). In 2000,

relationships with the local Head Start program, TPS provides all pre-K services in public school classrooms, with public school personnel as teachers.

As of the fall of 2001, approximately 66 percent of all Tulsa four-year olds were participating in either the pre-K program or a Head Start program with some sort of collaborative relationship with TPS.<sup>18</sup> This penetration rate slightly exceeds the state average for the same point in time.

TPS offers both full-day and half-day pre-K programs, depending on the school. As of the fall of 2000, approximately 43 percent of all pre-K students were in full-day programs, and approximately 57 percent were in half-day programs.<sup>19</sup>

A key reason for selecting Tulsa as a research site is the unusual availability of some test data from August 2001.<sup>20</sup> The test, known as the Early Childhood Skills Inventory (ECSI), was administered by TPS teachers to four-year-olds about to begin the TPS pre-K program and to five-year-olds about to begin the TPS kindergarten program. It featured three questions on

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Oklahoma ranked 39<sup>th</sup> in the nation in child poverty (*Kids Count Data Book 2003*, Baltimore, Md., Annie Casey Foundation, p. 145).

<sup>18</sup> According to the TPS Attendance Report for 2001-02, there were 1,626 four-year-olds in the TPS pre-K program and 663 four-year-olds in Head Start programs linked to TPS as of October 17, 2001. This yields the numerator, 2,289. According to the TPS Attendance Report for 2002-03, there were 3,641 kindergarten students in TPS as of November 8, 2002. This is the denominator, because it captures those students who were eligible for pre-K the year before. Thus the penetration rate for Tulsa was 66.4 percent.

<sup>19</sup> The information on early childhood enrollments by school comes from the Office of Pupil Accounting, Tulsa Public Schools, Attendance Report for 2000-01. Information on full-day vs. half-day programs comes from ATulsa Public Schools Early Childhood Sites, 2000-01.

<sup>20</sup> In fact, approximately 78 percent of the tested children were tested in August 2001. Approximately 12 percent were tested in July 2001, and approximately 10 percent were tested in other months, due to scheduling challenges. It is important to note that the child's age in our

socio-emotional development, seven on cognitive/general knowledge, six on motor skills, and ten on language.

A distinctive feature of the Tulsa evaluation is its elaborate controls for selection bias, a problem that has compromised many previous evaluations of this nature.<sup>21</sup> Because both four-year olds and five-year olds took the same test at the same time, and because Tulsa has a strict age qualification for when a child may enroll in pre-K, it is possible to compare children with very similar birthdays (e.g., August of 1996, September 1996) whose parents are alike in that they selected the pre-K program for their child (see Table 2). This is important because parents who choose pre-K for their child may differ from parents who do not choose pre-K in terms of their education, work profile, parenting practices, or motivation.

The children with the August 1996 birthday enrolled in pre-K in 2000-01 and were tested a year after their enrollment; the children with the September 1996 birthday enrolled in pre-K in 2001-02 and were tested at the time of enrollment. Adding statistical controls for gender, race, ethnicity, eligibility for the school lunch program, and precise date of birth, it is possible to move beyond August-September birth comparisons to more extensive comparisons of children with birthdays ranging from September 1995 through August 1997. In effect, the evaluation captures the effects of the 2000-01 Tulsa pre-K program one year after children enrolled in that program.<sup>22</sup>

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analysis is always the age at the time of testing.

<sup>21</sup> For a fuller discussion of the evaluation's methodology and findings, see William Gormley and Ted Gayer, "Promoting School Readiness in Oklahoma: An Evaluation of Tulsa's Pre-K Program." Washington, D.C.: Georgetown Public Policy Institute, Georgetown University, 2003.

<sup>22</sup> A parallel evaluation, of a more conventional nature, focuses on children enrolled in

### Findings

As Table 3 suggests, the Tulsa pre-K program has positive effects for children as a whole. Children who have been exposed to the TPS pre-K program experience, on average, a 16 percent increase in their overall test score, after controlling for other variables. Positive effects of pre-K on language and cognitive skills account for most of the overall effects; motor skills also improve somewhat. For children as a whole, there are no statistically significant effects on socio-emotional development.

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kindergarten in 2001-02 and compares those who enrolled in pre-K the previous year with those who did not. Because the parallel evaluation does not control for selection bias, it provides a good baseline for assessing the extent of selection bias. The results of the parallel evaluation are reported in Gormley and Gayer, 2003.

These uneven findings across domains of development may be an artifact of the test used by the Tulsa Public School system, which dedicated only three items to socio-emotional outcomes. They may also reflect a strong emphasis on goals and activities that are specifically directed at developing cognitive and language skills, with more limited attention to the development of motor and socio-emotional competence. Although we did not assess teaching priorities within Tulsa pre-K classrooms, other evidence suggests that pre-elementary settings in the U.S. emphasize academic over social development as compared with their counterparts in other countries.<sup>23</sup>

A closer look at racial and ethnic subgroups reveals some interesting differences (see Table 4). Hispanic children benefit the most from the program. Their test scores improve by 54 percent, after controlling for other factors, with sharp gains in both cognitive development and language skills. For black children, test scores improve by 17 percent, after controlling for other factors. Cognitive test score gains are especially noticeable for black children, followed by language skill improvements. For white children as a whole, there are no statistically significant effects. We should note, however, that the testing instrument may not be sufficiently versatile to

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<sup>23</sup> Lewis, C (1995). *Educating hearts and minds: Reflections on preschool and elementary education in Japan*. New York: Cambridge University Press.

capture improvements by high-performing white students.<sup>24</sup> We do not report any results for Asian or Native-American children, because the number of children in these two categories was relatively small.<sup>25</sup>

If we break our data down by school lunch eligibility status, we also see some interesting differences (see Table 5). For children ineligible for a free or reduced price school lunch (i.e., students from a higher socio-economic bracket), there are no effects. For children eligible for a reduced price lunch, pre-K boosts their language scores by 35 percent. More substantial effects are evident for children eligible for a free lunch. For such children, we see a 31 percent increase in cognitive skills, an 18 percent increase in language skills, and a 15 percent increase in motor skills as a result of exposure to pre-K. Social-emotional skills seem to decline somewhat, but we

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<sup>24</sup> Thirty-five percent of white children receive the maximum cognitive score as opposed to the 24% of black children and 15% of Hispanic children. For the future, we have remedied this problem by administering the Woodcock-Johnson Achievement test, with no artificial ceiling, to all children.

<sup>25</sup> Our sample included 42 Asian children and 191 Native American children. In future research, we hope to be able to assess the effects of pre-K on Native American children.

do not have a great deal of confidence in these particular measures.

As noted earlier, some TPS children experience a half-day pre-K program, while others experience a full-day pre-K program. Do children exposed to a full-day pre-K program fare better than children exposed to a half-day pre-K program?

Because children from different racial and ethnic backgrounds are exposed to a full-day pre-K program at different rates, it is important to break down our results separately for full-day and half-day program participants. For example, black children are much more likely and white children are much less likely to enroll in a full-day pre-K program. Hispanic children are more evenly distributed across part- and full-day programs. Thus we need to consider each ethnic group separately if we are properly to assess the effects of a full-day program.

The advantages of a full-day pre-K program are most evident for Hispanic children (see Table 6). For these children, we see dramatic increases in test scores for full-day children, no improvements for half-day children. Overall, the test scores of Hispanic children in a full-day pre-K program improve by 73 percent, after controlling for other factors. Cognitive and language skills improve dramatically; motor skills improve as well.

In the case of black children, we also see statistically significant increases in test scores for full-day children, no increases for half-day children (see Table 7). Specifically, the overall test scores of black children exposed to full-day pre-K increase by 18 percent, buoyed primarily by a 33 percent increase in cognitive test scores.

As Table 8 indicates, white students enrolled in a half-day pre-K program experience a 19 percent increase in language test scores. In short, white students do benefit from pre-K, though these benefits are weaker than for other ethnic groups. There are no statistically

significant effects of full-day pre-K on white children.

It is also useful to consider effects for children whose socio-economic status varies, as measured by eligibility for the school lunch program, depending on whether they enroll in a full-day or half-day pre-K program. As Tables 9-11 indicate, students eligible for a free lunch benefit from pre-K, whether half-day or full-day. Students eligible for a reduced price lunch benefit from pre-K if it is a full-day program but not if it is a half-day program. Students who must pay full price for lunch benefit from pre-K if it is a half-day program but actually fare worse if it is a full-day program. This latter finding could be due to peer effects, since students from more disadvantaged backgrounds are more likely to be enrolled in full-day programs than students from more advantaged backgrounds.

#### Policy Issues

The relatively recent proliferation of pre-K programs across the states has been propelled by expectations that they will promote school readiness and contribute to closing the achievement gap between children at risk and their more advantaged peers. The findings reported here provide a strong affirmation of this expectation. The positive effects of the Oklahoma pre-K program indicate that a Ascaled-up@ intervention focused exclusively on 4-year olds can lead to significant gains, especially for Hispanic and black children and children of lower socio-economic status, in cognitive and language skills. The findings raise numerous policy issues.

Targeted or Universal Pre-K? The major benefits of the Tulsa program accrued to minority and economically disadvantaged children, although white children attending part-day

pre-K programs showed modest test gains. These results are directly pertinent to current debates about targeted versus universally available pre-K programs. While the Oklahoma results suggest that targeted programs may focus resources on the children who generate the greatest benefits, other considerations point to the value of a universal approach. These include the political advantages of widespread public support and concerns about equity of access across racial and economic lines.<sup>26</sup>

It is also possible that some of the classroom benefits that accrue to disadvantaged children are attributable in part to the presence of more advantaged children in the same classroom. In fact, some research on elementary and secondary school children points in this direction.<sup>27</sup> Because we did not know the socioeconomic characteristics of children in different pre-K classrooms during the 2000-01 school year, we were unable to examine questions about how the ethnic and socio-economic mix in pre-K classrooms affects the pattern of gains found in the Tulsa evaluation. We do, however, hope to address this question in future research, when we will have access to more detailed information on the pre-K classroom environment to which children were exposed.

Full-day or Part-day Program? Substantial evidence indicates that greater exposure to

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<sup>26</sup> For additional arguments in favor of universal pre-K, see Barbara Wolfe and Scott Scrivner, *Providing Universal Preschool for Four-year-Olds*. In Isabel Sawhill, ed., *One Percent for the Kids* (Washington, D.C.: Brookings Institution, 2003), pp. 113-135.

<sup>27</sup> Caroline Hoxby, *Peer Effects in the Classroom: Learning from Gender and Race Variation*, NBER Working Paper 7867, August 2000; Eric Hanushek, John Kain, Jacob Markman, and Steven Rivkin, *Does Peer Ability Affect Student Achievement?* Hoover Institution, Stanford University, August 2001. See also the classic report on this issue, by James Coleman et al., *Equality of Educational Opportunity*, Washington, D.C.: U.S. GPO, 1966.

early interventions generates greater benefits<sup>28</sup>. The current results support this conclusion, especially for Hispanic students, where a fair comparison can be made because of relatively equal numbers of students in full-day and half-day pre-K programs.<sup>29</sup> The fact that full-day programs are more likely to address the child care needs of working families is a secondary, but not inconsequential, benefit.

On the other hand, full-day programs are more costly. For example, in Oklahoma, the base compensation rate, which determined how much school districts received from the state per pre-K child, was \$3,238 for a full-day program, \$1,743 for a half-day program, in 2002-03. In short, the state paid approximately 86 percent more for each full-day slot than for each half-day slot. Also, it is possible that some children, such as more advantaged children, reap fewer benefits from a full-day program.<sup>30</sup>

Public School or Multiple Service Delivery Sites? The Tulsa Public Schools run all of their pre-K programs, which helps them to maintain a relatively high level of program control. While they collaborate with Head Start programs, they insist, for the most part, that Head Start

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<sup>28</sup>National Research Council and Institute of Medicine (2000). *From Neurons to Neighborhoods: The Science of Early Childhood Development*. Washington, DC: National Academy Press.

<sup>29</sup> It is easier to demonstrate statistically significant findings for a sample of 745 children (blacks, full-day) than for a sample of 145 children (blacks, half-day). Thus we hesitate to assert that full-day programs benefit black children more than half-day programs, even though the evidence does point in that direction.

<sup>30</sup>While the Tulsa data suggest this to be the case, given the likely difference in the mixes of children in full- vs. part-day programs in our sample (a larger share of disadvantaged children in the full-day programs), the fact that the white children benefitted from the part-day (but not the full-day) program could be as attributable to the peer group as it is to the duration of the program day.

personnel meet their higher teacher education requirements. In principle, this should mean that Head Start programs perform even better than they otherwise would. Across the state, collaborations also occur. For example, the three school districts that collaborate with child care centers place early childhood certified teachers in the classrooms (at no cost to the center). Overall, these arrangements set Oklahoma apart from most other states, which typically rely on subcontracts with Head Start, and, in many instances, with child care programs, multi-service community agencies, and religious organizations to provide their pre-K programs.

Trade-offs involve expanded flexibility and the potential for more rapid program expansion at the cost of program control and perhaps more variable staffing and quality, as well as program philosophy. The Tulsa evaluation, restricted as it is to public school programs, is not able to bring data to bear on these trade-offs. It does, however, lend empirical support to the proposition that the public school system is a viable and effective vehicle for delivering educational services to young children.

Avenues to Quality. The Oklahoma pre-K program emphasizes the value for young children of highly educated, trained, and compensated teachers B a premise that is universally accepted once children enter kindergarten. It also ensures that the teachers are responsible for manageable numbers of children. Other approaches place a greater emphasis on standardized curricula or pedagogical guidelines, adherence to nationally accepted guidelines for high-quality early childhood care (e.g., NAEYC guidelines or Head Start Performance Standards), or blends of teacher qualifications, program guidelines, comprehensive services, and parent involvement. Again, the Tulsa evaluation is not able to compare the relative effectiveness of these approaches; its findings are restricted to Oklahoma's relatively unique reliance on highly and appropriately

trained teachers combined with group sizes that promote adequate attention to every child in the program. Nevertheless, the Tulsa evaluation does suggest that a strategy for educational gains focused on employing well qualified and well compensated teachers can be successful, either in addition to or as an alternative to a curriculum-focused strategy.

To Evaluate or Not? Only a handful of state pre-K programs have instituted routine testing of participating children and even fewer have been subjected to rigorous program evaluations<sup>31</sup>. This is regrettable in this era of accountability. Specifically, it leaves states and school districts with virtually no basis on which to make significant decisions about the future direction of their pre-K programs. Credible evaluations are difficult to mount in the context of on-going programs but, as the Tulsa evaluation attests, not impossible. When conducted, it is important that pre-K evaluations be planned in close collaboration with program administrators and teachers, be carefully focused on program goals, use the most comparable contrast groups and most psychometrically sound tests possible, and gather as much information about internal program practices as possible.

A particularly interesting finding of the Tulsa evaluation is that failure to control for selection bias may underestimate the effects of pre-K on young children. The direction of selection bias that may afflict previous studies is difficult to predict on the basis of social science theorizing alone. If only the most motivated and effective parents are the ones who manage to enroll their children in pre-K programs, then unmeasured parent characteristics may lead earlier studies to overstate the benefits of pre-K participation. On the other hand, if pre-K program

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<sup>31</sup>Gilliam, W.S., & Zigler, E.F. (2001). A critical meta-analysis of all evaluations of state-funded preschool from 1977 to 1998: Implications for policy, service delivery and program evaluation. *Early Childhood Research Quarterly*, 15(4), 441-473.

administrators select children from the most disadvantaged families to participate or otherwise encourage such participation, then unmeasured family attributes may cause earlier studies to understate the gains from such programs. Because both of these scenarios are plausible, previous non-experimental evaluations have been appropriately interpreted with some caution. But in Tulsa, at least, the opposite is the case: when selection bias is accounted for, the discernible effects of pre-K actually increase.<sup>32</sup>

#### Conclusion

In sum, the Tulsa pre-K program offers an example of the success with which systematic, school-based initiatives can launch four-year olds on a promising trajectory into elementary and secondary school education. Minority children showed dramatic gains in the cognitive and language skills that predict strong kindergarten achievement. These effects were evident in full-day programs but not in half-day programs. The effects of pre-K on white children were weaker and were limited to half-day programs, but future research, employing a different testing instrument, will be better suited for high-performing children, who are more likely to be white.

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<sup>32</sup> For direct evidence on this point, see William Gormley and Ted Gayer, "Promoting School Readiness in Oklahoma: An Evaluation of Tulsa's Pre-K Program," Washington, D.C., Georgetown University, 2003.

The pre-K program produced limited gains in motor skills, no gains in socio-emotional development.

Several features of the Oklahoma program offer promising opportunities for replication in other sites. These include reliance on highly and appropriately trained teachers, comparable levels of teacher compensation across the pre-K and elementary grades, small group sizes and ratios, and an emphasis on full-day programming. Oklahoma's relatively unique emphasis on universality has engendered political and public support for the program and may contribute to classroom mixes of children that foster the gains we have demonstrated, particularly for children of color and those from disadvantaged families. As the nation continues its experimentation with pre-K education, it will be critical to support high-quality evaluations that can elucidate the key ingredients of successful programs as they foster not only academic outcomes, but also the development of pro-social behavior and motivation to learn.

TABLE 1  
RACIAL, ETHNIC COMPOSITION  
OF TULSA PUBLIC SCHOOLS STUDENT BODY  
2001-02

| GROUP           | PROPORTION OF STUDENT BODY |
|-----------------|----------------------------|
| White           | 43%                        |
| Black           | 35%                        |
| Hispanic        | 12%                        |
| Native American | 9%                         |
| Asian           | 1%                         |

Source: Tulsa Public Schools (<http://www.tulsaschools.org>, accessed July 15, 2003).

Table 2

EVALUATION STRATEGIES

Conventional Evaluation

K, 01-02

|     |    |                    |
|-----|----|--------------------|
|     | No | Yes                |
| Yes |    | Experimental Group |
| No  |    | Control Group      |

Pre-K  
00-01  
CU

Pre-K  
00-01

Georgetown Evaluation

K, 01-02

|     |                                                      |                    |
|-----|------------------------------------------------------|--------------------|
|     | No                                                   | Yes                |
| Yes |                                                      | Experimental Group |
| No  | Control Group:<br>must be enrolled in<br>Pre-K 01-02 |                    |

TABLE 3  
EFFECTS OF PRE-K ON TEST SCORES,  
TULSA, OKLAHOMA

|                           | TOTAL | SOC/EMT | COGNITIVE | MOTOR | LANGUAGE |
|---------------------------|-------|---------|-----------|-------|----------|
| ALL CHILDREN<br>(N=2,243) | 16.0% | n.s.    | 17.2%     | 8.4%  | 16.5%    |

Note: Each number indicates the percentage improvement in test score attributable to the pre-K program. This percentage was obtained by logging the dependent variable (or test score), after controlling for other variables. Logging yields an intelligible measure of impact and accounts for the possibility of a non-linear functional form. It is particularly appropriate because it measures the percentage increase in scores at the discontinuity birth date (September 1, 1995), where eligibility to enroll in pre-K changes. Only statistically significant effects (at the .10 level or better) are reported. An n.s. signifies not statistically significant. For more detailed information, see William Gormley and Ted Gayer, "Promoting School Readiness in Oklahoma: An Evaluation of Tulsa's Pre-K Program," 2003.

TABLE 4  
EFFECTS OF PRE-K ON TEST SCORES,

TULSA, OKLAHOMA,

BY RACE, ETHNICITY

|                   | TOTAL | SOC/EMI | COGNITIVE | MOTOR | LANGUAGE |
|-------------------|-------|---------|-----------|-------|----------|
| BLACKS (N=906)    | 17.1% | n.s.    | 28.1%     | n.s.  | 15.2%    |
| HISPANICS (N=276) | 53.6% | n.s.    | 54.3%     | n.s.  | 58.6%    |
| WHITES (N=829)    | n.s.  | n.s.    | n.s.      | n.s.  | n.s.     |

Note: Each number indicates the percentage improvement in test score attributable to the pre-K program. This percentage was obtained by logging the dependent variable (or test score), after controlling for other variables. Logging yields an intelligible measure of impact and accounts for the possibility of a non-linear functional form. It is particularly appropriate because it measures the percentage increase in scores at the discontinuity birth date (September 1, 1995), where eligibility to enroll in pre-K changes. Only statistically significant effects (at the .10 level or better) are reported. An n.s. signifies not statistically significant. For more detailed information, see William Gormley and Ted Gayer, "Promoting School Readiness in Oklahoma: An Evaluation of Tulsa's Pre-K Program," 2003.

TABLE 5  
EFFECTS OF PRE-K ON TEST SCORES,  
TULSA, OKLAHOMA,  
BY SCHOOL LUNCH ELIGIBILITY

|                       | TOTAL | SOC/EMT | COGNITIVE | MOTOR | LANGUAGE |
|-----------------------|-------|---------|-----------|-------|----------|
| FULL PRICE (N=849)    | n.s.  | n.s.    | n.s.      | n.s.  | n.s.     |
| REDUCED PRICE (N=238) | n.s.  | n.s.    | n.s.      | n.s.  | 34.7%    |
| FREE (N=1,156)        | 25.7% | -9.0%   | 31.2%     | 15.4% | 18.4%    |

Note: Each number indicates the percentage improvement in test score attributable to the pre-K program. This percentage was obtained by logging the dependent variable (or test score), after controlling for other variables. Logging yields an intelligible measure of impact and accounts for the possibility of a non-linear functional form. It is particularly appropriate because it measures the percentage increase in scores at the discontinuity birth date (September 1, 1995), where eligibility to enroll in pre-K changes. Only statistically significant effects (at the .10 level or better) are reported. An n.s. signifies not statistically significant. For more detailed information, see William Gormley and Ted Gayer, "Promoting School Readiness in Oklahoma: An Evaluation of Tulsa's Pre-K Program," 2003.

TABLE 6  
EFFECTS OF PRE-K ON TEST SCORES,

TULSA, OKLAHOMA,

HISPANICS, HALF-DAY, FULL-DAY

|                                | TOTAL | SOC/EMT | COGNITIVE | MOTOR | LANGUAGE |
|--------------------------------|-------|---------|-----------|-------|----------|
| HISPANICS, HALF DAY<br>(N=140) | n.s.  | n.s.    | n.s.      | n.s.  | n.s.     |
| HISPANICS, FULL-DAY<br>(N=131) | 73.4% | n.s.    | 90.8%     | 38.5% | 73.8%    |

Note: Each number indicates the percentage improvement in test score attributable to the pre-K program. This percentage was obtained by logging the dependent variable (or test score), after controlling for other variables. Logging yields an intelligible measure of impact and accounts for the possibility of a non-linear functional form. It is particularly appropriate because it measures the percentage increase in scores at the discontinuity birth date (September 1, 1995), where eligibility to enroll in pre-K changes. Only statistically significant effects (at the .10 level or better) are reported. An n.s. signifies not statistically significant. For more detailed information, see William Gormley and Ted Gayer, "Promoting School Readiness in Oklahoma: An Evaluation of Tulsa's Pre-K Program," 2003.

TABLE 7  
EFFECTS OF PRE-K ON TEST SCORES,  
TULSA, OKLAHOMA,

BLACKS, HALF-DAY, FULL-DAY

|                             | TOTAL | SOC/EMT | COGNITIVE | MOTOR | LANGUAGE |
|-----------------------------|-------|---------|-----------|-------|----------|
| BLACKS, HALF-DAY<br>(N=145) | n.s.  | n.s.    | n.s.      | n.s.  | n.s.     |
| BLACKS, FULL-DAY<br>(745)   | 18.5% | n.s.    | 33.3%     | n.s.  | n.s.     |

Note: Each number indicates the percentage improvement in test score attributable to the pre-K program. This percentage was obtained by logging the dependent variable (or test score), after controlling for other variables. Logging yields an intelligible measure of impact and accounts for the possibility of a non-linear functional form. It is particularly appropriate because it measures the percentage increase in scores at the discontinuity birth date (September 1, 1995), where eligibility to enroll in pre-K changes. Only statistically significant effects (at the .10 level or better) are reported. An n.s. signifies not statistically significant. For more detailed information, see William Gormley and Ted Gayer, "Promoting School Readiness in Oklahoma: An Evaluation of Tulsa's Pre-K Program," 2003.

TABLE 8  
EFFECTS OF PRE-K ON TEST SCORES,  
TULSA, OKLAHOMA,  
WHITES, HALF-DAY, FULL-DAY

|                             | TOTAL | SOC/EMT | COGNITIVE | MOTOR | LANGUAGE |
|-----------------------------|-------|---------|-----------|-------|----------|
| WHITES, HALF-DAY<br>(N=609) | n.s.  | n.s.    | n.s.      | n.s.  | 18.9%    |
| WHITES, FULL-DAY<br>(N=216) | n.s.  | n.s.    | n.s.      | n.s.  | n.s.     |

Note: Each number indicates the percentage improvement in test score attributable to the pre-K program. This percentage was obtained by logging the dependent variable (or test score), after controlling for other variables. Logging yields an intelligible measure of impact and accounts for the possibility of a non-linear functional form. It is particularly appropriate because it measures the percentage increase in scores at the discontinuity birth date (September 1, 1995), where eligibility to enroll in pre-K changes. Only statistically significant effects (at the .10 level or better) are reported. An n.s. signifies not statistically significant. For more detailed information, see William Gormley and Ted Gayer, "Promoting School Readiness in Oklahoma: An Evaluation of Tulsa's Pre-K Program," 2003.

TABLE 9  
EFFECTS OF PRE-K ON TEST SCORES,  
TULSA, OKLAHOMA,

FREE LUNCH ELIGIBLES, HALF-DAY, FULL-DAY

|                                              | TOTAL | SOC/EMT | COGNITIVE | MOTOR | LANGUAGE |
|----------------------------------------------|-------|---------|-----------|-------|----------|
| FREE LUNCH ELIGIBLES,<br>HALF DAY<br>(N=335) | 27.3% | n.s.    | 23.7%     | n.s.  | n.s.     |
| FREE LUNCH ELIGIBLES,<br>FULL DAY<br>(N=802) | 25.7% | n.s.    | 34.8%     | 14.9% | n.s.     |

Note: Each number indicates the percentage improvement in test score attributable to the pre-K program. This percentage was obtained by logging the dependent variable (or test score), after controlling for other variables. Logging yields an intelligible measure of impact and accounts for the possibility of a non-linear functional form. It is particularly appropriate because it measures the percentage increase in scores at the discontinuity birth date (September 1, 1995), where eligibility to enroll in pre-K changes. Only statistically significant effects (at the .10 level or better) are reported. An n.s. signifies not statistically significant. For more detailed information, see William Gormley and Ted Gayer, "Promoting School Readiness in Oklahoma: An Evaluation of Tulsa's Pre-K Program," 2003.

TABLE 10  
EFFECTS OF PRE-K ON TEST SCORES,  
TULSA, OKLAHOMA,

REDUCED PRICE LUNCH ELIGIBLES, HALF-DAY, FULL-DAY

TOTAL SOC/EMT COGNITIVE MOTOR LANGUAGE

REDUCED PRICE LUNCH  
ELIGIBLES (HALF DAY)  
(N=108)

n.s. n.s. n.s. n.s.

REDUCED PRICE LUNCH  
ELIGIBLES (FULL DAY)  
(N=128)

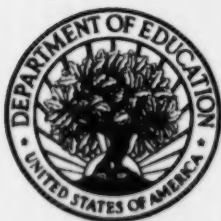
52.2% n.s. 61.0% n.s. 63.8%

Note: Each number indicates the percentage improvement in test score attributable to the pre-K program. This percentage was obtained by logging the dependent variable (or test score), after controlling for other variables. Logging yields an intelligible measure of impact and accounts for the possibility of a non-linear functional form. It is particularly appropriate because it measures the percentage increase in scores at the discontinuity birth date (September 1, 1995), where eligibility to enroll in pre-K changes. Only statistically significant effects (at the .10 level or better) are reported. An n.s. signifies not statistically significant. For more detailed information, see William Gormley and Ted Gayer, "Promoting School Readiness in Oklahoma: An Evaluation of Tulsa's Pre-K Program," 2003.

TABLE 11  
EFFECTS OF PRE-K ON TEST SCORES,  
TULSA, OKLAHOMA,  
CHILDREN WHO MUST PAY FULL PRICE FOR LUNCH, HALF-DAY, FULL-DAY

|                                                     | TOTAL | SOC/EMT | COGNITIVE | MOTOR | LANGUAGE |
|-----------------------------------------------------|-------|---------|-----------|-------|----------|
| FULL PRICE LUNCH<br>ELIGIBLES (HALF DAY)<br>(N=583) | n.s.  | n.s.    | n.s.      | n.s.  | 24.8%    |
| FULL PRICE LUNCH<br>ELIGIBLES (FULL DAY)<br>(N=259) | n.s.  | n.s.    | n.s.      | n.s.  | -24.6%   |

Note: Each number indicates the percentage improvement in test score attributable to the pre-K program. This percentage was obtained by logging the dependent variable (or test score), after controlling for other variables. Logging yields an intelligible measure of impact and accounts for the possibility of a non-linear functional form. It is particularly appropriate because it measures the percentage increase in scores at the discontinuity birth date (September 1, 1995), where eligibility to enroll in pre-K changes. Only statistically significant effects (at the .10 level or better) are reported. An n.s. signifies not statistically significant. For more detailed information, see William Gormley and Ted Gayer, "Promoting School Readiness in Oklahoma: An Evaluation of Tulsa's Pre-K Program," 2003.



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